

Craniofacial Anomalies: A Proactive Approach for the Dental Practitioner

Nagalakshmi Jawaharlal, K Umasankar

ABSTRACT

Congenital malformations have seen a steep increase over recent years. Facial defects too have increased five-fold as a consequence. As dentists grapple with treating such defects, a simple model for prenatal identification of potential risks and counseling coupled with referral and a communication model is presented. With no start-up costs and zero investment in terms of money, such sensitization is expected to be the platform for reduction in congenital facial defects due to education and optimized treatment. Teledentistry, internet and clinical research are cited as tools for effective reduction in birth defects.

Keywords: Congenital, Facial, Defects, Maternal risks, Dental, Sensitization.

How to cite this article: Jawaharlal N, Umasankar K. Craniofacial Anomalies: A Proactive Approach for the Dental Practitioner. *World J Dent* 2013;4(2):126-130.

Source of support: Nil

Conflict of interest: None declared

INTRODUCTION

Congenital birth defects present a huge socioeconomic problem for both the affected family and the government. After the initial psychological impact on the parents and the immediate family, the upbringing of the child usually strains the financial resources of the family and puts an onus on the government.

Apart from establishing centers for treatment of children with congenital defects, the continued care for the child into adulthood, special education, counseling and reproductive management of such patients, the government has to design special health policies and welfare organizations apart from mainstream health care.

In India alone, 5 lakh babies (approximately half a million) are born every year with some form of birth defects.¹ The burden of genetic diseases leaves a scar on the patient, care takers, society and the government funding. There is noticeable increase in morbidity and decreased quality of life as these patients, more often than not, has life-long afflictions.^{1,2}

Eighty-five percent of children are born with severe or minor genetic defects. Nine percent are born with infectious diseases. Two percent of all live births have congenital anomalies.³

CONGENITAL CRANIOFACIAL ANOMALIES

What are birth defects? According to 'March of Dimes,' which is a landmark report on birth defects, it is defined as

'A structural/functional anomaly that presents in infancy or later in life and is caused by events preceding birth, whether acquired or inherited.'³

As is the case of cleft lip and palate, more than one factor may be responsible for the birth anomaly—genes may predispose and environmental factors may compound or trigger its expression. As it exhibits a complex nature, it is difficult to pinpoint a particular trigger and more often than not, the expression has a domino effect, one event sequencing to another.⁴

In India, 1 in 40 babies are born with structural birth defects like malformed heart, etc. and 1 in 80 are born with mental retardation, increasing in infants with birth defects.^{1,5}

All over the world, 1 in 5 children with structural birth defects die or do not reach adulthood.³ The life time cost for sustaining a child with such defects and care given exceeds Rs. 30 lakhs (3 mil) approximately. There are direct costs like treatment, associated services (speech therapy) and special education. There are indirect costs also like leave taken by parents to care for such children, associated man hours lost, transport, wages for caretakers, etc.

ETIOLOGY

Vaginal environment can cause birth defects. Vaginosis (especially due to Gram-negative bacteria) is a most implicated cause.

Increase in maternal age increases the predisposition of birth defects⁶ (Table 1).

The cinch here is a major part of 'micro' growth that is most affected by teratogens, is completed around the 5th or 6th week of intrauterine life, even before the woman is aware that she is pregnant. Oral aspects of the embryo progress in the first 10 weeks to a major extent.

The two most common anomalies of face are cleft lip and cleft palate. They may or may not be associated with syndromes. About 200 different syndromes are known to occur with facial clefts.⁷

Table 1: Risk associated with maternal age

Maternal age (years)	Risk (%)
19-30	10
30-34	14.2
35-39	19
>39	29

According to one study, work place hazards do contribute to a person's increased propensity to produce a baby with birth defect. Biological, chemical, pharmaceutical and radiology professionals, etc. do face increased risk if exposure is in the formative/reproductive years.⁸

World over too, the same scenario exists. According to CDC report on congenital defects, roughly 7.9 million babies are born every year, due to genetic or paragenetic origins.⁹ Maternal exposure to teratogens is the most implicated reason.

So, where do we stand on this issue? As general dental practitioners or specialists, we need to be sensitized on this issue of how to recognize a potential problem. We do get a number of referral patients, conduct dental camps, etc. Hence, to recognize and treat patients with genetic problems on continual basis is essential. If we can educate the patients about the existing risks in producing a congenitally malformed child—we are taking a giant step in reducing potential birth defects. The population we examine may be limited as opposed to a regular medical practitioner or a community medical expert, but the percentage is significant nevertheless.

SENSITIZATION

How does a dental professional get sensitized about the potential risks that present itself in the dental office? Is coordination necessary? Sensitization can be achieved during and after dental school (Figs 1 and 2).

The pararental/auxiliary staff too, needs to be educated to recognize this issue as they may encounter such patients during their course of work. Dental nurses and hygienists also may play an active part in such education.

What are the Risk Factors involved in Congenital Facial Defects? (Fig. 3)

Lifestyle diseases such as diabetes and hypertension needs to be given a serious look as the developing countries are

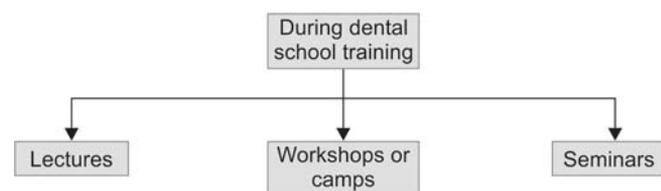


Fig. 1: Sensitization during dental school

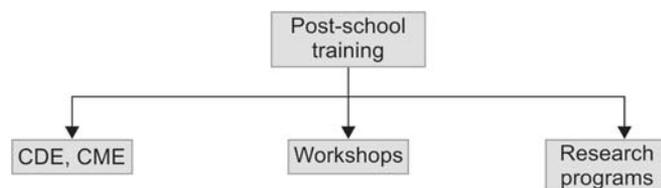


Fig. 2: Sensitization after dental school

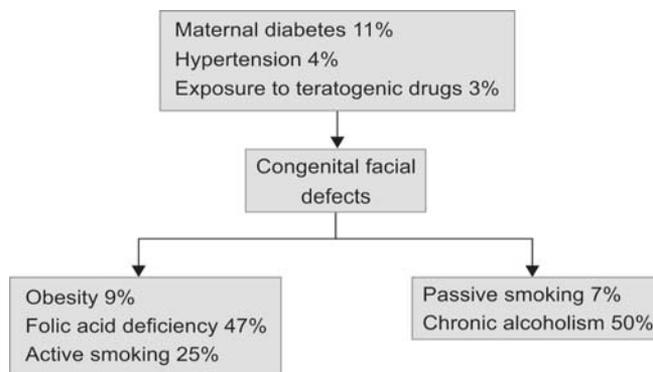


Fig. 3: Maternal risk factors

more prone for these diseases, in the past few years. The mother under risk or sufferance must be monitored strictly—diet, medications, physical activity, etc.

Exposure to teratogenic drugs/agents is a very serious risk as it has a cumulative effect rather than immediate outcome. Possible exposure at home, work place, sudden exposure (accidental), etc. must be recorded and data collected for future reference and for government records. The Chernobyl disaster, Bhopal tragedy are examples of accidental exposures whereas the chronic exposure to uranium arising out of coal-fired thermal plants in Punjab is an example of environmental hazard.¹⁰

Very obese (BMI > 30) patients who come for dental treatment or those who are a part of examination (e.g. those examined in camps) should be advised on the potential effects of their condition. They may face the problem of diabetes, hypertension, infertility, etc. The quantity and quality of cells available for reproduction may be poor.

Folic acid and iron deficiency have been traditionally linked to neural tube defects and clefting.⁹

Active and passive smoking is a very serious concern in the present day. With many women storming the work place, they may have to endure passive smoking.¹¹ Active, on the other hand may be due to societal acceptance issues, psychological factors or age-related problems. The same can be said for alcoholism.

The dental patient, who has been identified of such problems or gives a history, should be treated as a 'potential risk'.

What is the Need?

Women of childbearing age should be educated about their present state of health and potential complications arising out of their lifestyle or exposure to varied agents. Though it may not a part the dentist's job, such counseling and identification of risk factors, referral for correction, etc. could save the parents from the trauma of bearing a child with congenital facial deformities.

The dentists are exposed to a variety of patients in all age groups. General questions, as a part of data collection (case history) or as a casual conversation will reveal a lot about the present health condition of the patient. Simple tests that are already part of a regular dental set-up will expose the microcondition of the patient. There are no additional costs involved and no further investment in infrastructure.

What Needs are to be Identified?

These risks can be grouped under three main subheadings:

- Biomedical risks
- Behavioral risks
- Social risks (Fig. 4).

Should Our Thinking Change?

Care for pregnant women and children

TO

Care for women from pubertal age, and children from prenatal period.

PRECONCEPTIONAL ASSESSMENT AND CARE

As dentists are at a position where all age groups visit for dental care, the reach is more. When a patient visits for dental treatment records and follow-ups could help the data centers in maintaining and identifying potential or existing risks for which they might not have sought treatment or sometimes even aware of.

What Needs to be Done?

- Education of women regarding congenital defects–facial and otherwise
- Counseling regarding risk factors
- Constant monitoring–along with yearly dental check-ups
- Balanced diet follow-up–all through the reproductive years
- Treatment/change in lifestyle for chronic illnesses
- Referral for genetic, prenatal and perinatal problems
- Registration of risk people–research matter collection–collaboration with university or NGO for data purposes.
- Online registration, distance monitoring, etc.

Data collection and counseling should encompass the following:

- Family history

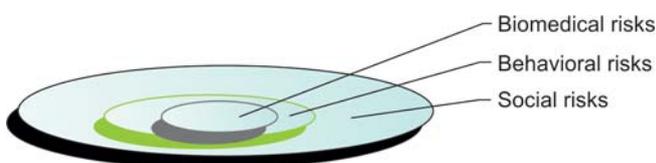


Fig. 4: Risk identification

- Consanguinity
- Chronic illness
- Drugs-medical and substance abuse
- Alcohol
- Tobacco
- Nutrition
- Iron deficiency and folic acid
- Obesity
- HIV
- STD
- Genetic testing for risk cases–familial–e.g. Cleft lip, palate, cystic fibrosis
- Racial prevalence factors–e.g. Thalassemia, sickle cell anemia
- Vaccination–German measles, Chicken pox, hepatitis B.

Commonly Encountered Risks

Diabetes

Adequate management and constant monitoring will reduce birth defects and obese infants, four-fold.⁷

Hypothyroidism

Base levels of thyroxin needed to ensure proper neurological development of fetus.⁵

Phenylketonuria

A properly advised, reduced phenylalanine diet to prevent congenital defects.³ Facial dysmorphism, microcephaly, delayed development, cardiac defects.

Obesity

May predispose to obese babies, neural tube defects, preterm disposition, cesarean probability, hypertension and thromboembolism.¹²

STD

Ectopic pregnancies, infertility, pelvic inflammatory disease, mental retardation may be present.⁹

Alcohol

Fetal heart syndrome.¹³

Antiepileptic Drugs

Dosage has to be moderated to prevent fetal ear and heart abnormalities and cleft formation, miscarriage, pre-eclampsia, decreased birth weight.⁴

Oral Anticoagulants

Known teratogenicity.¹⁴

Smoking

Preterm disposition, decreased birth weight, neural tube defects.¹¹

Over the Counter Drugs

Teratogenicity, allergy.¹⁴

Environmental Hazards

Soil, water, radiation exposures.⁸

Reproductive History

Prior C section, no. of pregnancy, prior miscarriage.⁷

Carcinoma Therapy

Chemotherapy, radiation, etc.³

Increased BMI

Osteoporosis, preterm disposition, decreased birth weight, increased chances of cesarean delivery.³

Decreased BMI

Neural tube defects, still births, postpartum anemia, predisposition to C section.¹⁵

Hypocalcemia

Degradation of maternal bone.^{15,16}

Where should the Care Start?

Care prior to pregnancy—right through the fertile years^{3,17} is mandatory.

From menarche, preferably, every year, data can be collected when patients come for dental treatment. Records can be maintained and collaborated with Community Medical/ Dental people to identify, counsel and manage people at risk.

Nutritional profile, lifestyle assessment, malnutrition, occupational disorders all need to be identified and treated. These can be a part of yearly dental checkups organized through schools and those at risk can be referred for management. Follow-ups through schools are easy.

Some governments have implemented free noon meal schemes for government schools for ensuring good food as well as literacy among children—the effectiveness of food supplied through such schemes also can be evaluated first hand by maintenance of growth charts and health records.

Role of Dentists

In a Teaching Hospital:

- Patient education on preconceptional care
- Counsellor in every hospital
- Camps to educate women, children especially, teenagers. Screening for chronic diseases at all ages
- Media to be used for new tests and mass communication
- Data accumulation, processing and research publications
- Establishment and maintenance of online portal and teleconferencing for remote areas.

In Private Practice

- Camps
- Data collection and collaboration with medical personnel/teaching hospitals
- One-to-one education.

Role of Government

- Mandatory yearly or at least once-in-two year checkups for women and teenagers of both sexes, on the lines of DOTS, for example—that will ensure continual monitoring
- Computerization of such data—so that patient can be checked at any place and updated in the country
- Low cost preventive methods must be established
- Health coverage for lower income women
- Public awareness programs
- Funding for research
- Evidence-based publications and forum creation
- National registry for craniofacial defects to be open for all updates, registration and discussion forums
- Online communication with other countries to keep updated about local policies and data
- Special treatment centers for congenital craniofacial anomalies in major cities that are equipped with teleconference facilities so that remote areas are well connected.

Health Policy Makers

Other than medical personnel many have limited or no knowledge of birth defects causes and preventive methods. Even medical personnel are unaware of such preconceptional means.¹⁸ Treatment is the only aspect people concentrate upon, which happens to be the 'result'. But the cause perinatal aspects remain unrecognized and untreated.

Mass education, representation to policy makers about the importance of preventive care, allotment of adequate funds for sensitization and establishment of birth defects

forums for extending help, funds for institutional and global research are some of the steps to lessen the impact of birth defects.

CONCLUSION

It is great to be born rich and famous but it is greater to be born healthy. Good health is the fundamental right of every baby that adults should ensure.¹

Dental professionals, with their wide reach of patients, across all ages, can be sensitized, empowered to identify and corroborate in mass education regarding birth defects and e-linked for knowledge sharing regarding the following:

- Identifying risk factors
- Data collection
- Usage of media for educating public
- Usage of networking to identify birth defects and collaborate with other doctors
- Participation in research.

With adequate data, publications and mass education only can birth defects be reduced as the cost of caring for such a child is 10 times more than the cost incurred for a normal child. As the old adage goes, prevention is better than cure. With absolutely no start up costs or additional financial inputs, such campaigns will gain mileage in long-term reduction in congenital facial defects specifically and birth defects in general.

REFERENCES

1. Theogaraj SD, Joseph LBM, Mani M. Statistical analysis of 750 cleft lip and palate patients. *Indian J Plast Surg* 2007;40:70-74.
2. Wiet GJ, Meyers AD. Reconstructive surgery for cleft palate. *eMedicine Specialities*. June 2010.
3. March of Dimes Birth Defects Foundation. April 2006.
4. Fraser FC. The genetics of cleft lip and palate. *Am J Hum Genet* 1970;22:336-52.
5. Dutta DK. Reproductive and child health care (1st ed). New Delhi: Jaypee Brothers Medical Publishers 2006;30-35.

6. Patel ZM, Adhia RA. Birth defects surveillance study. *Indian J Pediatr* 2005;72(6):489-91.
7. Rao K. Current concepts in Perinatology. New Delhi: Jaypee Brothers Medical Publishers 2008:56-68.
8. Lorenti C, Cordiel S, Beregeret A, De Walle HE, Goujard J, Ayne S, et al. Maternal risk factors for oral clefts: Occupational exposure and congenital malformations in working group. *Scand J Work Environ Health* 2000 Apr;26(2):137-45.
9. Mitchell LE. Birth defects. *Am J Med Genetics* 1992;42:5-9.
10. Chamberlain G. The Observer. Uranium (coal-fired power stations) 2009 Aug.
11. Christianson RE. The relationship between smoking and incidence of congenital anomalies. *Am J Epidemiol* 1980;112:684-95.
12. Suresh S, Thangavel G, Sujatha J, Indrani S. Methodological issues in setting up a surveillance system for birth defects. *Natl Med J India* 2005 Sept-Oct;18(5):259-62.
13. Godbole, et al. *Indian pediatrics* Jan 2009;46:86-95.
14. Kallen B. Maternal drug use and infant cleft lip and palate with special reference to corticoids. *Cleft Palate Craniofac J* 2003 Nov;40(6):624-28.
15. Lippincott. Professional guide to diseases (8th ed). Lippincott Williams & Wilkins 2005:200-15.
16. Dutta DE. Manual of fetal medicine (1st ed). New Delhi: Jaypee Brothers Medical Publishers 2009:87-90.
17. Salvi VS. Problems associated with birth defects. *J Post Graduate Med* 2003;49:195-96.
18. Available from: www.birthdefects.org.

ABOUT THE AUTHORS

Nagalakshmi Jawaharlal (Corresponding Author)

Reader/Associate Professor, Department of Dentistry, Tamil Nadu Medical Services, Chennai, Tamil Nadu, India, e-mail: niknag99@yahoo.com

K Umasankar

Professor, Department of Orthodontics, Saveetha Dental College and Hospital, Chennai, Tamil Nadu, India